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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,658	01/29/2004	Masaki Okamoto	NGB-36409	5389

116 7590 02/05/2009

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EXAMINER	
PATEL, SHAMBHAVI K	
ART UNIT	PAPER NUMBER
2128	

MAIL DATE	DELIVERY MODE
02/05/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/767,658	OKAMOTO ET AL.	
	Examiner	Art Unit	
	SHAMBHAVI PATEL	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/7/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-19 have been presented for examination.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 07 November 2008 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the Examiner has considered the IDS as to the merits.

Response to Arguments

3. Applicant's arguments filed 17 November 2008 regarding the prior art rejection have been fully considered but they are not persuasive.

Regarding the prior art rejection:

i. **Applicant submits,** regarding claims 1, 13 and 14, that Sarvar does not disclose a first simulated condition.

Examiner notes that the term "simulated condition" is not defined in the specification, and that the meaning of "first simulated condition" is indefinite. The first condition appears to be condition data inputted by a user, or based on input from the user. It is unclear how this is a "first simulated condition". Examiner has attempted to give the term its broadest reasonable interpretation based on paragraph 0040 of the specification:

> While, the condition setting portion 23 sets the conditions under which the mounting process simulation system 1 executes the simulation process based on the process condition data input by the user via the input device 3, and then forms the condition table. For instance, in the case of the conditions of the solder printing step, **the user inputs the production conditions (solder conditions, printing mask conditions, printing device conditions, etc.), etc. of the simulated equipment as the process condition data**. Here, if the processed simulation should be executed in detail, the user has to input a large number of process condition data. In order to simplify such inputting operation, the common process condition data and the process condition data that are decided in connection with other data are stored previously in the common condition DB 51, and then the condition setting portion 23 forms the condition table while supplementing the process condition data stored in the common condition DB 51 in response to the input from the user.

Sarvar discloses performing the first simulation step (simulation of the specific heat capacity) based on the inputted heat flow values (i.e. condition data).

ii. **Applicant submits**, regarding claim 3, that Sarvar does not disclose executing an interpolation calculation using simulated result data.

Examiner notes Sarvar teaches the calculation (i.e. simulation) of variations of heat capacity based on inputted conditions **(section IV.B).** These variations are then interpolated **(IV.C).** Thus, the interpolation is based on simulated data.

iii. **Applicant submits,** on page 13 of the remarks, "For similar reasons as discussed above, Sarver et al. fails to teach or suggest executing a simulation of the second step based on a second condition, wherein the *second condition comprises the simulation condition at least a third condition* in order to yield a second simulation result, as recited in the rejected claims."

Examiner notes that as shown above and below, the heat capacity values are simulated conditions, and thus Sarvar discloses this limitation.

iv. **Applicant submits,** that a calculation is not the same as a simulation.

Examiner notes that the prior art is directed to simulation of the reflow soldering process. The initial use of empirical data does not indicate that the prior art does not teach the claimed method. As stated above, the specification indicates that the initial condition is based on user input—this is **not** simulated data. Sarvar takes an initial value, and through calculations, determines variations of the heat capacity—thus, the prior art **simulates** variational values of the heat capacity.

4. Applicant's remaining arguments regarding the prior art rejection are moot in view of the new grounds of rejection presented below.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding **claims 1, 13 and 14, Examiner** notes that the term "simulated condition" is not defined in the specification, and that the meaning of "first simulated condition" is indefinite. The first condition appears to be condition data inputted by a user, or based on input from the user. It is unclear how this is a "first simulated condition". Examiner has attempted to give the term its broadest reasonable interpretation based on paragraph 0040 of the specification:

> While, the condition setting portion 23 sets the conditions under which the mounting process simulation system 1 executes the simulation process based on the process condition data input by the user via the input device 3, and then forms the condition table. For instance, in the case of the conditions of the solder printing step, **the user inputs the production conditions (solder conditions, printing mask conditions, printing device conditions, etc.), etc. of the simulated equipment as the process condition data**. Here, if the

> processed simulation should be executed in detail, the user has to input a large number of process condition data. In order to simplify such inputting operation, the common process condition data and the process condition data that are decided in connection with other data are stored previously in the common condition DB 51, and then the condition setting portion 23 forms the condition table while supplementing the process condition data stored in the common condition DB 51 in response to the input from the user.

All other claims are rejected by virtue of their dependency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 13 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by **Sarvar ("Effective Modeling of the Reflow Soldering Process: Basis, Construction, and Operation of a Process Model")**

Regarding claim 13:

Sarvar discloses a mounting process simulation system provided to steps of a mounting process composed of a plurality of steps to execute a simulation of the mounting process, comprising:

a. an inputting portion for inputting a plurality of simulated conditions to execute the simulation **(figure 1; IV.B; table III: heat flow, specific heat capacity)**

b. an executing portion for executing the simulation based on the condition input from the inputting portion **(figure 1)**

c. an outputting portion for outputting a result of the simulation executed by the executing portion **(figure 1)**

d. wherein the executing portion includes:

   i. a condition table forming portion that forms a condition table of a second step positioned subsequently to a first step, whereby the condition table is formed by using a simulation result simulated based on a first simulation condition selected for at least a first step, of a second step positioned subsequently to a first step **(IV.B:**

first condition is heat flow and first simulated result is specific heat capacities) The specific heat capacities is modeled using an *interpolation table.* The first step is varying the heat capacity, and the second step is measuring the temperature.

ii. simulation result outputting portion executes the simulation of the second step based on the simulated condition data from the condition table and a condition input from the inputting portion **(section V.A: user inputs process conditions)** and outputs a result to the outputting portion **(page 131 'Modeling Variable Materials Data' paragraphs 1-3).** The variation of the temperature is calculated based on this first condition.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-12 and 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarvar et al. ('Effective Modeling of the Reflow Soldering Process: Basis, Construction, and Operation of a Process Model') in view of **Ekere ("Solder Paste Printing Process Modeling Map").**

Regarding claims 1 and 14:

Sarvar discloses a mounting process simulation program of causing a computer to execute a simulation of a mounting process composed of a plurality of steps, and a method of executing a simulation, comprising:

a. a first simulation executing step of executing a simulation **(IV.B: specific heat capacity calculated (i.e. simulated))** based on a first simulated condition selected for a first step **(IV.B: heat flow)**.

b. a simulation condition deciding step of selecting a simulated result from the first simulation executing step as a simulation condition for a second step positioned subsequent to the first step **(Table III; 'Modeling of an Exemplar Product and Process Combination').** The specific heat capacity is varied, and this value is used to calculate the peak temperatures.

c. a second simulation executing step of executing a simulation-of the second step based on a second condition containing at least the simulation condition **(section V.B)** and a third condition **(section V.A: user inputs process conditions)** that yields a second simulation result that is displayed **(Table III),** wherein the first simulation executing step and the second simulation executing step are each directed to different successive steps in the plurality of steps composing the mounting process **(section V.B: multiple steps are simulated, such as the simulation of the variable heat capacity values, simulation of the peak temperature, simulation of the oven, etc).**

Sarvar does not explicitly disclose simulating printing or mounting. **Ekere teaches** simulating solder paste printing **(Ekere: abstract).** At the time of the invention, it would have been obvious to one of ordinary skill in the art to combine the teachings of Sarvar and Ekere because solder paste printing is a crucial process in the reflow soldering of surface mounted electronic components **(Ekere: abstract).**

Regarding claim 2:

Sarvar discloses that the simulated analysis result data are generated via simulation at every step based a plurality of conditions which were previously simulated and the second step executes the simulation of the second step by sampling the simulated analysis result data which is simulated based on the second condition. **(page 128 'Radiative Heating': typical reflow profile).** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be data produced in the first simulation step that is then analyzed and/or sampled in the second simulation step, and 'wherein analysis result data simulated previously based on a plurality of conditions are generated every step' to mean that this data is produced at every step.

Regarding claim 3:

Sarvar discloses generating simulated analysis result data at every step based on a plurality of simulated conditions which were previously simulated and executing the simulation of the second step by executing an interpolation calculation using the simulated analysis result data which is simulated based on a preceding or succeeding condition of the second condition **(page 131 'Modeling Variable Materials Data' paragraphs 1-3: varying the specific heat capacity to record the temperature changes).** The variable behavior of the specific heat capacity is represented in the models using *interpolation tables for each variable material.* **Sarvar discloses** simulating a typical reflow profile **(page 128 'Radiative Heating').** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be any data produced in the first simulation step that is then analyzed and/or sampled in the second simulation step, and 'wherein analysis result data simulated previously based on a plurality of conditions are generated every step' to mean that this data is produced at every step.

Regarding claim 4:

Sarvar discloses generating the simulated analysis result data at every step based on a plurality of conditions **(page 131 'Modeling Variable Materials Data' paragraphs 1-3: varying the specific heat capacity to record the temperature changes)** and executing the simulation of the second step by converting the simulated

analysis result data generated by other device into predetermined data format **(page 129 'Specific Heat Capacity Values' 1st paragraph: deriving the specific heat capacity by using the heat flow from samples analyzed with a calibrated Mettler TA3000 differential scanning calorimeter).** This is analogous to the outside device in the claim language. The derived value is then converted to a computed-readable value and used in the simulation **(page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1). Sarvar discloses** simulating a typical reflow profile **(page 128 'Radiative Heating').** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be any data produced in the first simulation step that is then analyzed and/or sampled in the second simulation step.

Regarding claim 5:

Sarvar discloses the simulation program of claim 4 wherein the experimental data simulated at every step via a CAE tool is selected as the analysis result data **(page 127 'Outline of System Components' 2nd paragraph; page 129 'Specific Heat Capacity Values' paragraph 1),** wherein the type of data selected as the analysis result data is converted to a predetermined format **(figure 1 post processing and data presentation).** The specific heat capacity is experimentally derived and is then used in the simulation as the analysis result data to calculate its effect on the temperature variation **(page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1).**

Regarding claims 6 and 19:

Sarvar discloses a mounting process simulation program according to claim 1, further causing the computer to execute an animation displaying step of displaying three-dimensionally an animation to indicate a result simulated in the second simulation executing step on a display device, by reading previously- stored animation elements based on a definition file in which an operation sequence is defined every step **(figure 8; page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1).**

Regarding claim 7:

Sarvar discloses a mounting process simulation program according to claim 1, wherein the second simulation executing step includes a condition acquiring step of reading a condition selected in response to an input from a condition database in which a plurality of conditions are stored previously in combination, and adding the condition to the second condition **(page 131 'Modeling Variable Materials Data' paragraph 3)**. The specific heat capacity is modeled using tables.

Regarding claim 8:

Sarvar discloses a mounting process simulation program according to claim 7, wherein the condition acquiring step further reads data from a CAD system in response to the input and adds the data to the second condition **(figure 1).**

Regarding claim 9:

Sarvar discloses a mounting process simulation program according to claim 1, wherein the first simulation executing step executes the simulation to contain production variation in the first step **(Table III: production variation specific heat capacity)**, the simulation condition deciding step decides the result simulated in the first simulation executing step to contain the production variation as the simulation condition and the second simulation executing step executes the simulation of the second step based on the second condition to contain the production variation **(Table III: simulation to determine variation in temperature due to variation in specific heat capacity).**

Regarding claim 10:

Sarvar discloses a mounting process simulation program according to claim 1, wherein the first simulation executing step executes the simulation based on a change of a control item set in the first step as the first condition **(IV.B first condition is heat flow)**, the simulation condition deciding step decides the result simulated based on the change of the control item in the first simulation executing step as the simulation condition **(IV.B first simulation calculated specific heat capacities)**, and the second simulation executing step executes the simulation of the second

step based on the second condition to contain the result simulated based on at least the change of the control item **(Table III: simulation to determine variation in temperature due to variation in specific heat capacity).**

Regarding claim 11:

Sarvar discloses a mounting process simulation program according to claim 1, further causing the computer to execute a reliability evaluating step of executing a reliability evaluation of a product manufactured in the mounting process by using the result simulated in the second simulation executing step **(figure 6).**

Regarding claim 12:

Sarvar discloses a mounting process simulation program according to claim 1, further causing the computer to execute a fraction defective calculating step of calculating a fraction defective of a product manufactured in the first simulated step and the second simulated step, by using simulated results which were simulated in the first simulation executing step and the second simulation executing step **(Introduction: paragraphs 2 and 3).**

Regarding claims 15 and 17:

Sarvar discloses selecting the first, second, and third condition from a plurality of simulated conditions **(section IV.B; table III).** The plurality of conditions include the specific heat capacities, the heat flow, and the material properties.

Regarding claims 16 and 18:

Sarvar discloses the program of claim 15 wherein the plurality of simulated conditions include part conditions **(section IV.B heat flow).**

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. **Examiner's Remarks:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shambhavi Patel whose telephone number is (571) 272-5877. The examiner can normally be reached on Monday-Friday, 8:00 am – 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571) 272-2279. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SKP

/Kamini S Shah/
Supervisory Patent Examiner, Art Unit 2128